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Evaluating governance arrangements and decision-making for natural resource management planning: An empirical application of the Governance Systems Analysis Framework

Abstract

Governance continues to be a challenge in the management and conservation of natural resources. It is difficult to strategically address governance challenges without understanding the dynamics, capacities, and knowledge application of institutions within such governance systems. This paper examines the use of Governance Systems Analysis (GSA) to compare, evaluate and benchmark governance arrangements for regional natural resource management (NRM) planning. It is applied in two Australian regional NRM case studies in Cape York and the Wet Tropics. Our analysis of governance arrangements for NRM planning in the two regions finds that while they are structurally and functionally similar, they have different capacities for decision-making about planning. The paper concludes with a discussion of the usefulness and implications of using the GSA as an evaluative framework to analyse governance in regional NRM planning systems.

Keywords: governance arrangements, natural resource management, decision-making outcomes, planning, Wet Tropics, Cape York, case studies, evaluation

1.0 Introduction

Governance continues to be a challenge in the management of natural resources. Natural resource management (NRM) is operationalized through a web of interdependencies and interactions between a multitude of institutions (Dovers, 2001). The interactions between institutions impacts on governance, and environmental outcomes for NRM (Dale et al., 2013c; Dietz et al., 2003). Despite this, few existing evaluative frameworks are used in practice to analyse such governance systems holistically (For example Burns, 2006; Hill & Hupe, 2006). Instead, there is a tendency for theorists and governments alike to apply frameworks that only partially analyse isolated or individual components of the governance system, such as the efficacy of an individual programs, rather than the

cumulative affect of institutional relationships, interactions and frameworks in a region influencing the success of NRM activities at the regional scale (Conley & Moote, 2003; McDavid & Hawthorn, 2006).

The experience in Australia is no exception to this trend. A number of empirically and theoretically-grounded frameworks have been used to analyse and evaluate aspects of natural resource governance including their constituent strategies, plans, programs, and institutions (Althaus et al., 2007; Bellamy et al., 2001; Connick & Innes, 2003; Curtis et al., 1998; Hajkowicz, 2009; Vogel, 2011; Walter Turnbull, 2005). There have been also been a number of Australian Government-driven evaluations of the efficacy of NRM policies and programs since the mid 1990s (ANAO, 1997, 2008; NHT, 2000; SSCRRAT, 2010; Walter Turnbull, 2005).

The need for stronger and more systemic evaluative mechanisms and performance criteria for evaluating the governance of NRM has repeatedly been recommended by these evaluations to assess national progress towards desired NRM outcomes. Despite these calls for improved evaluative frameworks, there has been little attempt to develop or apply an evaluative framework based on either existing theoretical frameworks, or accepted normative best practice principles. Rather, a number of short-term, one off or poorly funded, and output focused monitoring frameworks are currently used to assess NRM outputs in Australia.

As a response to these problems, the Governance Systems Analysis (GSA) framework was developed by Dale et al. (2013b) and Potts et al. (2014), as a way to analyse governance systems and provide direction for strategic governance reform. The GSA framework has been applied to evaluate governance arrangements for the management of the Great Barrier Reef (Dale et al., 2013c), and the Australian carbon farming initiative (Dale et al., 2013a).

The aim of this paper is to explore the implications and usefulness of the GSA as an evaluative framework to analyse governance in regional planning systems, by examining the connections between regional NRM institutions, their access to knowledge, and their capacity to make decisions within the region. To do this it applies the GSA to two Australian regional NRM case studies – Cape York and the Wet Tropics- and analyses the structural and functional aspects of the their governance systems. In this paper, structures are defined as individuals,

institutions, and alliances that are involved in delivering specific desired outcomes (e.g. strategy development) in governance systems (Kalu, 2011). Functions, on the other hand, are the underlying decision-making capacity, connectivity, and knowledge use of these governance structures applied to deliver desired outcomes (Dale & Bellamy, 1998).

2.0 Conceptual framework

A number of empirically and theoretically grounded evaluative frameworks exist to analyse governance systems (Burns, 2006; Hill & Hupe, 2006; Kenward et al., 2011; Ostrom, 2009; Pahl-Wostl, 2009; Sabatier & Jenkins-Smith, 1993; Wallington et al., 2008). The use of these evaluative frameworks in practice has varied, with some used more extensively (e.g. Ostrom, 2009; Sabatier & Jenkins-Smith, 1993) than others (e.g. Kenward et al., 2011). While they are useful for identifying problems at the policy, plan or program scale, most do not address governance systems holistically. Indeed, there is limited capacity among the identified evaluative frameworks to consider the cumulative influence of the interactions between plans, policies and programs and the more functional institutional capacities and relationships within governance systems as a whole on the governance outcomes delivered.

The GSA is an analytical framework that was developed to address the lack of systemically-oriented evaluative frameworks for governance systems and to inform governance reform in complex landscapes (Dale et al., 2013b; Dale et al., 2013c). It uses the lens of structural-functionalism in combination with planning and systems theory to support analysis of the complex, multiscale interactions within NRM governance systems. Structural-functionalism is an early form of systems theory drawn from sociology that argues that social systems (or in this case, governance systems) can only be understood through the interactions of system components (Fisher, 2010; Fontes & Guardalabene, 1976; Groth, 1970). For further information on structural-functionalism and its use in the GSA framework see Potts et al. (2014).

Potts et al. (2014) argue that when combined with critical systems thinking, governance and planning theories, structural-functionalism can be transformed from an abstract sociological theory to a practical evaluative lens for planning

systems. Structural-functionalism is a particularly strong and logical foundation (rather than grand theory) for evaluation of governance systems because it enables decision-makers to identify which components are limiting the success of planning, and then focuses their attention on improving and reforming those areas (Potts et al., 2014).

The GSA framework (Table 1) uses the policy-making process described by the planning policy analysis tradition and policy scientists such as Althaus et al. (2007) to define structural concepts within its analysis. This enables consideration of the interactions among structures within governance systems and how they function, while also providing an overarching assessment of the system's capacity to deliver strategic NRM planning or policy-making outcomes. The steps of the policy-making process used to frame the GSA's assessment include:

- vision and objective setting;
- strengths, weaknesses, opportunities and threats (SWOT) analysis;
- strategy development (within various structural elements of the system).
- implementation; and
- monitoring, evaluation and review.

A summary of the key interrogative questions raised by the GSA framework is shown in Table 1 (previously described and applied by Dale et al. (2013b), Dale et al. (2013c), and Potts et al. (2014)).

Table 1: Governance Systems Analysis Framework

	Decision-making Capacity	Connectivity	Knowledge-Use
Vision and Objective Setting	<ul style="list-style-type: none"> Do capacities exist to set higher level aspirational or condition targets? Do the relevant stakeholders have the knowledge, financial, human and infrastructure resources required? Do key institutions involved have strong corporate governance/continuous improvement systems? 	<ul style="list-style-type: none"> Are relevant stakeholders actively connected to decision-making? Are visions and objectives aligned to higher and lower scale visions and objectives? Are collaborative frameworks for setting visions and objectives well designed? Are there structured frameworks for bargaining and negotiation over setting visions and objectives? 	<ul style="list-style-type: none"> Are all forms of social, economic and environmental information available for vision and objective setting? Are traditional and historical knowledge sets being applied? Are appropriate decision-support tools in place to support scenario analysis?
Research and Assessment	<ul style="list-style-type: none"> Are there strong research and analysis capacities in place to inform other structural components of the system? Are there strong environmental, economic, and social research and analysis capacities in the system? 	<ul style="list-style-type: none"> Are there strong collaborative linkages between different research institutions? Are there effective brokerage and communication arrangements between research provider and end user stakeholders? Are collaborative arrangements in place to integrate social, economic and physical research? 	<ul style="list-style-type: none"> Are there systems in place for long-term research synthesis and knowledge retention? Are there broad research priority setting exercises that need to be refined? Are all forms of social, economic and environmental information available for systems decision-making?
Strategy Development	<ul style="list-style-type: none"> Do capacities exist to set clear strategic targets? Do the relevant stakeholders have the knowledge, financial, human and infrastructure resources available to make the decisions required? Do the key institutions involved have strong corporate governance and improvement systems? 	<ul style="list-style-type: none"> Are all relevant stakeholders connected to strategy decision-making? Are strategies aligned to visions and objectives? Are strategies aligned to higher/lower scale strategy development Are collaborative frameworks for setting objectives well designed? Do strategies integrate an appropriate solutions mix? 	<ul style="list-style-type: none"> Is there social, economic and environmental knowledge relating to the assessment of the efficacy of key strategies? Are decision support tools available to scenario test alternative strategies?

	Decision-making Capacity	Connectivity	Knowledge-Use
Implementation	<ul style="list-style-type: none"> • Are there capacities to implement a broad mix of strategic solutions? • Do the implementation players have the financial, human and infrastructure resources to implement? • Do the key institutions involved have strong corporate governance and improvement systems? 	<ul style="list-style-type: none"> • Are there effective partnership and integration arrangements between policy and delivery systems? • Do different components of the solution mix collaborate? • Are there effective research brokerage arrangements to support implementation? 	<ul style="list-style-type: none"> • Are there research efforts to inform continuous improvement in implementation? • Are local and traditional knowledge sets informing implementation? • Are effective data sets concerning implementation being managed and retained? •
Monitoring, Evaluation and Review	<ul style="list-style-type: none"> • Are there effective monitoring and evaluation capacities in the system? • Are there collective monitoring alliances in place? • Are there defined and independent evaluation capacities in the system? • Are there reporting capacities to enable high levels of accountability? 	<ul style="list-style-type: none"> • Are there integration arrangements between objective setting and monitoring systems? • Are evaluative and review mechanisms linked to long-term monitoring? • Are monitoring and reporting strategic processes able to influence strategic processes and the allocation of resources? 	<ul style="list-style-type: none"> • Are social, economic and environmental outcomes from the system being monitored? • Are monitoring and evaluation data being retained in the long-term?

Also published in: (Dale et al., 2013b; Dale et al., 2013c; Potts et al., 2014)

3.0 Methods

In order to evaluate and benchmark governance arrangements for regional natural resource management (NRM) planning, the research applied the GSA framework using a case study approach based on interpretivist epistemology. Interpretivism emphasises the plurality of perspectives regarding reality (Mathison, 2005) and is based on the posit that reality and knowledge are highly subjective, socially constructed, and cannot be understood easily from outside the 'field' (Mills et al., 2010). This also meant that emergent findings throughout the research were incorporated into the assessment of each case study region. The research methods used are discussed in greater depth below.

3.1 Selection of case studies

NRM in Australia is operationalised at the regional scale and there are 56 NRM regions across the country. As it was outside the scope of this study to examine all 56 regions, two were chosen based on illustrative grounds (Veal, 2006). The two regions include Cape York and the Wet Tropics, both located in Far North Queensland, Australia. Cape York and the Wet Tropics are two of Australia's most ecologically diverse and natural resource rich regions (Holmes, 2012; WTMA, 2011). Despite five attempts to develop regional land use or NRM plans for Cape York in the past twenty years, Cape York is the only NRM region in Australia without a community-owned NRM plan to guide implementation activities (CYPLUS, 1995; DEHP, 2012a; DSDIP, 2012; NHT, 2005).

The Wet Tropics NRM group, on the other hand, successfully delivered their first community-owned NRM plan in 2004 (FNQNRM, 2004). This dichotomy suggests that the capacity of the governance arrangements to deliver and support NRM planning outcomes is historically different in the two regions. Subsequently, Cape York and the Wet Tropics were chosen as illustrative case studies, to study the variability of the structures and functions for NRM planning and their role and influence on the decision-making outcomes delivered in the regions.

The natural resources of Cape York and the Wet Tropics are planned for and managed by a variety of organisations at various scales. This includes State and Australian Government authorities, local government agencies, a non-government

NRM group, a number of community organisations, Traditional Owner groups, and individual landholders (Balkanu, 2013; CYNRM, 2013; CYSF, 2010; DEHP, 2012a, 2012b; GBRMPA, 2011; SEWPaC, 2008).

The primary organisations involved in managing the natural resources of Cape York include Cape York NRM (the region's designated NRM body), Cape York Sustainable Futures (CYSF)(an economic development organisation), and the Balkanu Development Corporation (Balkanu)(an indigenous economic development organisation). The primary organisations involved in strategic decision-making and planning for the Wet Tropics' natural resources include Terrain NRM (the region's designated NRM body), the Wet Tropics Management Authority (WTMA)(responsible for the Wet Tropics World Heritage Area), and the Great Barrier Reef Marine Park Authority (GBRMPA)(responsible for managing the Marine Park).

The two regions are considered comparable as a result of their similar contextual factors, including their relatively large Indigenous populations, internationally significant natural resources, and because they share the same political and policy context (DAFF & SEWPaC, 2013; Holmes, 2011; Pert et al., 2010).

3.2 Data collection and analysis

Data was collected over an 18-month period in the case study regions between late-2012 and mid-2014, using an iterative three-step data collection process:

1. Secondary data analysis
2. Unstructured conversations and participant observation
3. Semi-structured interviews

Data included field notes, grey literature (i.e. institutional reports, pamphlets and websites, and regional plans), and interview transcripts. The GSA framework (Table 1) was used as the primary means of structuring the analysis of the data collected in this research. Consequently, the field notes, grey literature, and interview transcripts were coded based on their relevance to the steps of the planning process (e.g. vision/objective setting) and the governance function being described (e.g. connectivity).

Step One and Two involved a secondary data analysis, unstructured conversations with, and observation of regional participants in NRM activities. Step One and Two provided data regarding the contextual factors influencing regional NRM governance arrangements in Cape York and the Wet Tropics. Regional participants represented a number of sectors, including: the research sector (universities, private organisations, and government research bodies), government sector (Local, State, and Federal Government agencies/departments), and regional non-government organisation (NGO) sector (designated regional NRM groups, community organisations, Indigenous organisations, advocacy groups, and representative bodies).

Unstructured conversations occurred with approximately 30 regional participants in each region from a range of sectors who were in attendance of regional planning meetings, annual general meetings, and working in organisations involved in NRM activities that were observed in this project. The unstructured conversations were focussed on who the key NRM organisations in the region were, the key governance challenges in the region, and strengths of the region's governance arrangements for NRM planning. The initial insights gained from Step One and Two were coded, and then placed appropriately into the GSA framework (Table 1).

Step Three involved building on and validating the data collected in Step One and Two through iterative semi-structured interviews (applied using the Delphi Technique). The Delphi technique was selected specifically because it relies on the use of expert knowledge, does not involve participants meeting face-to-face (important in contentious contexts), and the systematic emergence of a concurrence of judgement/opinion (McKenna, 1994; Plummer & Armitage, 2007; Yousuf, 2007). The participants of Delphi expert panels are generally not randomly selected, rather they are chosen for their expertise and/or experience in the area being researched (Hay, 2005).

Step Three was a collaborative assessment process that engaged with 15 regional participants per region. Regional participants were invited to participate in up to three iterative semi-structured interviews (45 in total) based on their specific

knowledge and experience of NRM decision-making in the region (minimum 5 years of experience of NRM in the region/s). As the case study regions were geographically proximate and politically aligned, a number of the regional participants were able to contribute towards both governance descriptions because their position provides them with knowledge and experience in both regions.

During the first round of interviews, regional participants were provided with the GSA framework (Table 1) and asked to respond to the questions regarding each region. This data was then coded, synthesised with similar points, and then incorporated into the GSA framework matrix in the relevant cell. During the second and third rounds of interviews regional participants were presented with a GSA framework matrix containing evidence and conclusions regarding the capacity, connectivity, and knowledge use for the case study regions. Regional participants were invited to comment on the accuracy of the assessment, potential improvements in the evidence base, and identification of potential regional governance reforms.

During the second and third round of interviews regional participants were also asked to apply a five point scoring system (See Table 2) to each cell of the GSA framework (e.g. capacity for vision and objective setting). The scores were used to indicate the perceived likelihood and capacity of the governance system, and its subsequent structures to undertake each of the steps of the planning process. For the purposes of this research it was assumed that each step of the planning process is equally weighted in its importance. The scores nominated by the regional participants were then averaged to determine the likelihood of governance structures delivering their desired decision-making outcomes. The use of a common scoring system facilitated comparison of the case study regions.

Table 2: Governance Systems Analysis Framework scoring system

Indicative score	Description
1	The governance system is dysfunctional . The governance system is currently unable to deliver its intended outcomes.
2	The governance system is poorly functioning . The governance system is in poor overall health and is likely to fail to deliver its intended system outcomes.

3	The governance system is somewhat functional . The governance system is on a knife's edge and could fail or succeed to deliver its intended outcomes.
4	The governance system is functional . The governance system is in good overall health and is not likely to fail to deliver its intended system outcomes.
5	The governance system is highly functional . The governance system is in excellent overall health and will not fail to deliver its intended system outcomes.

The culmination of the data collected through the three step data collection process was a completed GSA framework matrix for each region containing triangulated evidence, conclusions and an indicative score regarding the system's performance towards delivering desired decision-making outcomes. Quotes from deidentified regional participants are used to support discussion in the results section, and are italicised and identified based on the participant's institutional sector.

4.0 Results

Table 3 contains a comparison of the indicative scores nominated by regional participants regarding the capacity, connectivity, and knowledge use of structures in the two case study regions. The table shows that cumulatively, regional participants believe that the structures for NRM planning in Cape York are **likely to fail to deliver** their intended outcomes from decision-making. Alternately, regional participants suggest that the structures for NRM planning in the Wet Tropics **could fail or succeed to deliver** their intended decision-making outcomes.

The ubiquitous weakness of the structures and functions for NRM planning in Cape York is in stark contrast to the variable, but somewhat stronger governance structures and functions for NRM planning in the Wet Tropics. Despite the obvious difference in overall systemic capacity to deliver decision-making outcomes between the two case studies, the structures and functions of the two systems are faced by the same challenges of institutional fragmentation, and high uncertainty due to external influences. The regions differ however in their maturity of governance arrangements to support NRM planning and planning histories. The

rationale for these scores is discussed below under the same headings found in Table 3.

Table 3: Summary of structural and functional scores for natural resource management planning governance arrangements in Cape York and the Wet Tropics

	Decision-making capacity		Connectivity		Knowledge use		Total (out of 15)	
	CY	WT	CY	WT	CY	WT	CY	WT
<i>Vision and objective setting</i>	2	4	2	3	2	3.5	6	10.5
<i>Research and assessment</i>	2	3.5	2	3	2	2.5	6	9
<i>Strategy development</i>	2	3.5	2.5	2.5	1.5	3	6	9
<i>Implementation</i>	2.5	2.5	1.5	3	2	2	6	7.5
<i>Monitoring, evaluation and review</i>	2	2.5	2	2	2	2	6	6.5
Total	10.5	16	10	13.5	9.5	13	-	-
Average score	2.1	3.2	2.0	2.7	1.9	2.6	6	8.5
CYP cumulative average score	2.00							
WT cumulative average score	2.83							
CY – Cape York WT – Wet Tropics								

4.1 Decision-making capacity

The maturity of the two governance systems is a significant influence on the development of structures and functions, and thus the overall systemic capacity to deliver desired decision-making outcomes. Despite both regions having a history of NRM planning, the overall systemic capacity to deliver desired decision-making outcomes is different. Arguably, the historical context of planning and paternalistic planning approaches in Cape York's past has been a significant constraint on the development of NRM planning structures. The five attempts at NRM and land use planning for Cape York in the last 20 years were largely not regionally mediated or regionally based processes.

On the other hand, the Wet Tropics had more than 30 years of historical context of NRM, NRM planning, and tripartisan support for NRM and NRM planning prior to the introduction of NRM groups in 2003 (McDonald & Weston, 2004; O'Rourke

& Memmott, 2005; WTMA, 2010). This meant that there was a stronger foundation of organisational arrangements to support the 2004 and present NRM planning processes. In this way, the historical context for NRM planning in the Wet Tropics region acted as a driver and support mechanism, rather than a constraint on the initial and ongoing development of structures and functions to support regional NRM planning. One regional participant in the Wet Tropics argued that at the local scale, *'the drive to make things happen by technical and tactical people... is exceptionally high. The amount of support they are given to do that is exceptionally low'* (Government Agency).

While the 2004 NRM planning process in the Wet Tropics had a constrained engagement framework, a more comprehensive and inclusive framework has been developed for the current process, building on the lessons of the 2004 process. This history of structures capable of delivering desired planning outcomes is also lacking in Cape York, limiting past frameworks that can be built on to support current NRM planning and stakeholder engagement. The capacity of governance structures to make decisions for NRM in the Wet Tropics is particularly high for vision and objective setting, research and assessment, and strategy development for NRM in the region. Arguably, a result of a combination of pre-existing decision-making capacity (due to previous planning investment and accrued capital), and emerging leadership and agency to address current NRM issues (Cavaye, 2005).

Conflict between multiple organisations engaged in NRM activities in Cape York has been a significant limitation on their capacity to set higher level aspirational targets for the region's natural resources. One interviewee compared the capacity of regional organisations to undertake NRM planning in Cape York and the Wet Tropics, suggesting that the Wet Tropics *'have got a car, but they need a transition box upgrade, some oil, or a different driver. In the Cape, they're still looking for tyres for the car'* (Government Agency). Changes to national NRM funding structures in 2012 reduced the value and availability of grants, in addition to regional restructuring of funding delivery. Some consider that this led to Cape York's three primary NRM organisations *'fighting each other for money to ensure their survival'* (Government Agency).

4.2 Connectivity

Institutional fragmentation was evident in both Cape York and the Wet Tropics case study governance systems, with varying levels of inclusivity and collaboration across the NRM planning structures. In the Wet Tropics, although the formal and informal relationships between the region's NRM organisations are somewhat fragmented, there is a strong underlying and demonstrated capacity to mobilise effort and coordinate effort at the regional scale when necessary. This suggests that the existing relationships between NRM planning structures in the Wet Tropics, while fragmented, provide sufficient levels of organisational capacity to enable the structures to deliver of some the system's desired decision-making outcomes.

In Cape York, on the other hand, regional organisations engaged in NRM planning and implementation are particularly fragmented following a long history of dissonance of organisational agendas and varied interpersonal relationships between the employees of some NRM organisations in the region. There is limited collaboration horizontally in Cape York, leading to significant competition/duplication of programs in the region, without a collective overarching vision or objectives. One interviewee in Cape York suggested that the lack of collaboration is underlined by *'the issue...that we aren't funded to achieve a shared agenda. If we were, we'd probably be doing it. Our funding comes in boxes to deliver specific projects. We are all captured by our contracts. We have little discretionary funding to invest in a shared agenda'* (Regional NGO).

The low levels of collaboration between organisations involved in NRM and NRM planning in Cape York is perhaps the most significant constraint on the capacity of the system to deliver its desired decision-making and environmental outcomes. While there were signs of improvement in the relationships between NRM organisations (e.g. the signing of a memorandum of understanding between two of the key organisations in mid-2014) across the time frame of this research, existing regional-scale organisational relationships and the ongoing NRM planning process are themselves not highly collaborative at that scale. As a result, many of the negative implications of poorly executed or planned participatory approaches identified in the literature are evident in Cape York. These include the

reinforcement of unequal power dynamics (Morrison, 2007), high levels of ambiguity in NRM problems and management solutions (Brugnach et al., 2011), and the failure of restructured and devolved arrangements to deliver significantly improved outcomes compared to top-down decision-making models (Reed, 2008).

Similar to Cape York, the connectivity that exists between regional NRM organisations engaged in planning, and particularly strategy development in the Wet Tropics is contingent on interpersonal relationships, mandate and/or convenience. While WTMA, Terrain NRM, and GBRMPA share an obvious interest in the management of the region's natural resources based on their mandates, the number of NRM projects that they actively collaborate and coordinate on is limited. The Australian Government funded Reef Rescue Program (part of the bilaterally negotiated Reef Plan) was repeatedly emphasised by participants as one of the few examples of effective collaboration between regionally-based NRM organisations, due to its acknowledgement and use of organisational mandates and its provision of sufficient financial resources to incentivise and facilitate collaborative action based on regional planning and science. A particular strength of the Reef Rescue Program that regional participants noted as significant for successful collaboration was that the program clearly identified the roles and responsibilities of the different organisations involved, reducing conflict amongst them.

Connectivity between local stakeholder groups and regional NRM organisations in the Wet Tropics such as the Mulgrave Landcare and Catchment Group and Terrain NRM is stronger than the connectivity between regional NRM organisations and centralised government agencies such as Terrain NRM and the Queensland Department of State Development, Infrastructure, and Planning. Fragmentation is also evident between structures in the region as *'strategy development and implementation are both undertaken by different players and the two processes are currently highly disjointed'* (Government Agency). This was argued to be a result of the proximity and location of various decision makers to local issues and stakeholders. For example, catchment level groups and the region's NRM organisations such as Terrain are all located outside of the main centre of Cairns. On the other hand, while government agencies may have

representatives based in the region, their primary decision-makers are usually based out of Brisbane or Canberra.

4.3 Knowledge use

Regional participants observed that there is very little social, economic, cultural and environmental data available to support decision-makers to develop visions, objectives or strategies for Cape York. Baseline data regarding the condition of resources is unavailable, further limiting the capacity of Cape York NRM, CYSF, or Balkanu to establish aspirational targets or objectives for regional NRM. Dichotomously, information availability to support vision and objective setting, and strategy development for NRM is quite high in the Wet Tropics due in part to the concentration of research institutions based in the region according to regional participants. Although *'[the Wet Tropics is] data rich as a region, there's traditionally been a pretty heavy focus on biophysical evidence, and there is a gap as far as the social and economic side of the equation'* (Regional NGO).

Interviewees in both regions strongly emphasised that there is a strong bias in the information available to inform decisions makers towards biophysical information. Participants in the Wet Tropics referred to high data availability specific to the ecological conditions of the Great Barrier Reef and Wet Tropics World Heritage Areas. They suggest that although social, economic and cultural information is available; it is much less prevalent than biophysical information and currently is only able to inform vision and objective setting in a perfunctory way.

All of the interviewees mentioned that there has historically been limited cohesive and integrated collection, retention or analysis of data regarding NRM strategy implementation in Cape York. Consequently, they explained there is also no mechanism to support or inform continuous improvement of implementation activities in the region. However, they noted that there is impetus among the organisations involved in NRM to draw on evidence where it is available to ensure their strategies are effective. Traditional and historical knowledge sets are recognised by most (if not all) NRM organisations in the Wet Tropics and Cape York as valuable. However, in the Wet Tropics they remain limited in their application to inform vision and objective setting or implementation.

5.0 Discussion

Taking a structural-functional approach to analysing NRM planning governance systems enabled comprehensive examination of not only decision-making outcomes in the Wet Tropics and Cape York, but also the interactions of structures and functions and their influence on decision-making outcomes. This was crucial in the two case study regions and in the Australian NRM context because past top-down, government driven evaluative models have previously failed to lead to vastly improved processes or outcomes (ANAO, 1997, 2008; NHT, 2000; SSCRRAT, 2010; Walter Turnbull, 2005).

One of the primary features of the GSA that differentiates it from other evaluative frameworks (Burns, 2006; Hill & Hupe, 2006; Kenward et al., 2011; Ostrom, 2005), is its consideration of the interactions, exchanges of knowledge and capacity of multiple institutions. The GSA framework overcomes the limitations of past studies on 'single-group governance of single-use commons' (Laerhoven & Ostrom, 2007). However, the GSA does not fit within the 'Mainstream' school of institutional thinking described by Cleaver (2012) and espoused by commons theorists such as Ostrom (2005) and (Roth, 2009). This is largely because it does not seek to predict, study, and influence institutional design around ideas of collective action, as was the case in Ostrom's Institutional Analysis and Development framework (Ostrom, 2005). Rather, the GSA framework seeks to examine the 'rules, boundaries, and processes are "fuzzy"; people's complex social identities, and unequal power relationships [that] shape resource management arrangements and outcomes' (Cleaver, 2012, p. 9). This suggests that the GSA framework sits in the 'Critical Institutionalism' school of thought, providing a different set of insight into governance and institutional arrangements that may not have been revealed in an evaluation of governance using 'Mainstream Institutionalism' frameworks.

In considering where each system fits within the broader governance system of policy silos and scales, the GSA framework acknowledged the systemic complexity of Cape York and the Wet Tropics by integrates both internal and external influences of governance into understanding the way in which the governance system functions. For example, in the Wet Tropics, it became clear that there was

a high degree of siloification of NRM issues, leading to high levels of institutional and strategic fragmentation, and lower than expected levels of collaboration between the State Government, WTMA, GBRMPA, Terrain NRM and other local groups on strategy development for regional-scale NRM action. This is an example of what Serageldin (1995) defines as the 'silo effect'. The 'silo effect' is argued to reinforce issues of fragmentation, whilst also limiting the quantity and efficacy of action on regional issues requiring a more integrated approach (Mitchell, 2005; Serageldin, 1995).

The Wet Tropics NRM planning governance system is likely to succeed in delivering on intended outcomes because of the strong underlying capacity, connectivity, and knowledge use of the region's decision-makers. Alternately, Cape York's NRM planning governance system does not function well and is unlikely to deliver on its intended outcomes due to both weak structures and functions in the system. This research found that current levels of institutional capacity in the Wet Tropics are particularly strong for developing plans and strategies, but weaker in implementation and monitoring. Thus, in order to ameliorate environmental degradation in both regions, greater attention to the capacity of the system's structures to undertake decision-making is needed to support more effective and enduring outcomes.

Our results suggest that the relationship between governance arrangements and environmental outcomes arising from decision making in NRM is influenced by a number of factors, including the maturity of decision-making arrangements, external politics and funding, interconnectivity of functions, and institutional history. This finding reinforces Cleaver's (2012) position that the efficacy of institutions is particularly affected by the 'entwinement', and history of institutions, as well as the interactions between the informal and formal arrangements of institutions. Recognising this, it is unsurprising that in the two case studies where NRM governance structures had high levels of connectivity, decision-making capacity, and application of knowledge, they were more likely to deliver on their intended outcomes. A comparison of the case study results further indicates that structures in governance systems are varied in their capacity to

deliver desired outcomes, mirroring the conclusions of the study by Robins and Kanowski (2011) on the capacity of NRM regions and institutions in Australia.

Regional participants reacted positively towards the GSA framework and its results. A number of the regional participants who were involved in this research indicated that the GSA assessment matrix had provided them with evidence to support regional-scale governance reform. They explained that the GSA matrix had served as a 'conversation starter', and enabled them to begin discussions with other individuals and institutions in the region surrounding current strengths and weaknesses of the governance system/s. Despite maintaining confidentiality throughout the application of the GSA framework, we discovered that many of the regional participants became aware of others who were involved in the research through their discussions. This outcome indicates that the GSA framework and its results are not only accessible to practitioners, but can serve as a catalyst for broader systemic reform.

6.0 Conclusions

Cape York and the Wet Tropics regions share a substantial number of similar characteristics, broader political and funding contexts, internal and external influences, and degree of institutional complexity. However, little was known until the completion of this research as to why the two regions were so different in the planning outcomes being delivered. Cape York remains the only NRM region (out of 56) in Australia not to have a community-owned NRM plan, while the Wet Tropics was one of the first to have a community-owned NRM plan in 2004. The GSA framework enabled us to understand not only whether the systems were likely to succeed to deliver their desired outcomes, but also identify within the complexity of the systems, specific factors limiting the capacity of decision-making. Our paper argues that the GSA framework provides a mechanism through which decision-makers in the two regions improved their understanding of region-specific human institutions and their affect on outcomes. The results also provided them with a strong foundation for evidence-based decision-making, strategic governance system reform, and improving outcomes of NRM planning in the case study regions.

The results described in this paper strongly suggest that the GSA framework is highly capable of comprehensively analysing and evaluating the structural and functional interactions in complex, non-hierarchical NRM planning governance systems. The paper also provides a previously unavailable systematic and ground-truthed analysis and comparison of the strengths and weaknesses of decision-making arrangements that support NRM planning in Cape York and the Wet Tropics; reflecting common differences among Australian NRM regions. The use of structural-functional concepts to analyse the governance systems reinforced the assertion by Dietz et al. (2003) that institutional factors are intrinsically linked to environmental outcomes.

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